PRIMER 7 Online Workshop

Multivariate Analysis for Ecology & Other Sciences

PRIMER-e
Empowering Research

PRESENTER: Distinguished Professor Marti J. Anderson *(Massey University and PRIMER-e)*
DATES: July 24th - 28th, 2023
TIME ZONE: 09:00 - 18:00, *West Coast USA, Pacific Daylight Time (UTC -7 hrs)*

OVERVIEW

This **PRIMER 7 Online Workshop** will take place over 5 days (Monday – Friday, 09:00 – 18:00). The workshop is designed to give a fundamental understanding of how to analyse and gain insights from multivariate data using the software **PRIMER version 7**. Participants will learn through lectures, demonstrations, and practical experience with the software. The schedule will include a combination of live, online lectures and practical sessions and, throughout the workshop, there will be plenty of time for asking questions and free-flow discussions with the presenter.

For much of the final day of the workshop (Friday, July 28th) participants will be allocated into a number of small break-out groups. Within each group, participants are encouraged to ***analyse their own data in real time*** in an open, collaborative setting, with support from other participants in the group and also from the presenter, who will visit each group in turn. This provides a fantastic opportunity to see how tools learned during the week can be applied to your own data to gain valuable insights. They are also a great time for Q & A and further discussion on any topics of special interest arising during the week.

Participants are expected to use their own computer, equipped with secure and reliable internet access, a microphone, and a camera, enabling direct communication online *via* Google Meet for the duration of the workshop. All workshop materials, including recordings of online sessions, will be made available to participants for the duration of the workshop and for a period of four (4) weeks thereafter.

Software may be purchased (at a discounted price – see below) *or* a ***free*** fully functional (but time-limited) licence will be made available to registered participants ***for trial use during the workshop***. Note that PRIMER is a Windows-only product, so Macs need to run in Windows emulation.

Please note*: a subsequent online PERMANOVA+ workshop will be held* ***October 16th - 20th, 2023****, USA Central Daylight Time (UTC -5 hrs). Details can be found here: https://www.primer-e.com/workshops/*.

CONTENT

This workshop will provide an extensive overview of statistical methods in non-parametric analysis of multivariate data implemented in the software **PRIMER 7**. The core basic multivariate routines in PRIMER 7 will be fully discussed, including: pre-treatment of data; definitions of similarity; clustering; ordination by principal components (**PCA**) and non-metric multi-dimensional scaling (**nMDS**); permutation tests on similarity matrices for structured (**ANOSIM**, **RELATE**) and unstructured (**SIMPROF**) cases; linking community to abiotic data (**RELATE** and **BEST**); biodiversity indices, including **taxonomic distinctness**; and graphical tools for effective presentation of results. Non-parametric statistics and

permutation tests make the methods intuitively simple to understand so **no prior background in statistics is required**.

This workshop will cater both to those who are **new to PRIMER** and to those who are "**old hands**" but would like a refresher. Other tools in PRIMER explored during the workshop include: **shade plots** with flexible ordering & clustering of axes; **dispersion weighting** for handling aggregated data; **coherence plots** to show groups of species having similar response patterns among samples; **divisive clustering** methods; similarity percentages (**SIMPER**) for identifying species that characterise groups of samples; **metric**, **threshold metric**, **non-metric** or **combined MDS** in any dimensions; **bootstrap averages** to show variation among averages in metric MDS space; **2-way versions** of BEST and RELATE; **new plot types** (bar, box, means, line, histogram, scatter, surface, shade) in 2-d or 3-d; **animations** of ordinations captured to video files; multi-factor and multi-variable **segmented bubble plots** in 2-d and 3-d; **ANOSIM** extended for **ordered factors** and **3-factor** designs and much more...

WORKSHOP FEES

Workshop fees ***for residents of the USA*** are: USD **$880** for Professionals and USD **$580** for full-time Students. Registration fees cover access to all workshop materials and live sessions. The registration fee **does not include** the separate (discounted) cost of **time-unlimited** software.

For those who do not reside in the USA, we offer ***Global Equitability Pricing*** (GEP), which includes a percentage discount off our standard US prices (for online workshop registration and software) in direct accordance with the *Price Level Ratio published by the World Bank* for their country of residence. Thus, the workshop fee ***depends on your country of residence***. Please consult our table of GEP prices (p. 3 below *et seq.*) to find your price to register for this online workshop ($USD). If you would like a quotation from us prior to registering, please get in touch with us directly at: primer@primer-e.co.nz.

DISCOUNTED SOFTWARE PRICES FOR WORKSHOP PARTICIPANTS

Workshop participants may purchase time-unlimited PRIMER software at ***10% off*** our standard prices in $USD. Participants who do not reside in the USA are ***also*** eligible for our ***Global Equitability Pricing*** (GEP). The workshop discount will be applied ***on top of*** the adjusted GEP price appropriate for each individual customer. For example, workshop-discounted prices for a ***single end-user licence*** of **PRIMER 7 with PERMANOVA+** across different sectors are shown below for residents of various countries:

Country of Residence	GEP discount (%)	Commercial licence ($USD)	Public licence ($USD)	Academic licence ($USD)	Student licence ($USD)
USA	0.00%	$1,620.00	$1,215.00	$810.00	$405.00
Canada	0.06%	$1,619.03	$1,214.27	$809.51	$404.76
Belize	36.13%	$1,034.69	$776.02	$517.35	$258.67
Costa Rica	46.51%	$866.54	$649.90	$433.27	$216.63
Mexico	50.46%	$802.55	$601.91	$401.27	$200.64
Colombia	63.71%	$587.90	$440.92	$293.95	$146.97

All prices are given in US dollars. Note that ***your price*** may well differ from those listed above. **All** discounts for which you are eligible (including, for example, discounts for upgrades from PRIMER 6) will

be applied on invoice. If you would like a quotation from us for workshop registration + software prior to registering, please get in touch with us directly at: primer@primer-e.co.nz.

REGISTRATION

To register, please fill out the registration form available on the PRIMER-e website (www.primer-e.com/workshops/) and return it directly to primer@primer-e.co.nz to secure your place. The deadline for registration and payment is **July 15th, 2023**. Late registrants will only be accepted if space permits. Please get in touch with us directly if you have any questions (primer@primer-e.co.nz), and especially if you would like:

- to ***obtain a quote*** for your registration (with or without software), including all ***discounts*** for which you are eligible;
- to register ***more than one individual*** from your organisation and pay on a single invoice (please include separate registration forms for each individual participant); or
- to purchase ***more than one software licence*** at discounted prices on a single invoice.

ABOUT THE PRESENTER

Distinguished Professor Marti J. Anderson (Massey University and PRIMER-e, *FRSNZ*) holds the Professorial Chair in Ecological Statistics at the New Zealand Institute for Advanced Study (NZIAS) at Massey University in Auckland. She is also the Director of PRIMER-e. Her core research is in community ecology, biodiversity, multivariate analysis, experimental design and resampling methods, with a special focus on developing novel statistical methods for ecology. She has developed all of the statistical methods in PERMANOVA+ and especially enjoys engaging in the dynamic interactions with students, academics and professionals that have become a trademark of the PRIMER/PERMANOVA+ international workshops, shedding new light on multivariate data.

GLOBAL EQUITABILITY PRICING (GEP)

Table of Global Equitability Pricing (GEP) discounts off standard (US) prices for individual countries, based on the *Price Level Ratio published by the World Bank*. Prices shown are for professional or student registration for a single individual to attend our online workshop after applying the GEP percentage discount shown. **All prices are in US dollars ($ USD)**. Prices do not include costs for bank fees or currency conversions. Note that the USA and all countries with a Price Level Ratio ≥ 1.0 relative to the USA are given a discount of 0.00%.

If your country of residence is not listed here, or if you have any other questions, please contact us directly at primer@primer-e.co.nz.

Country	% Discount	Professional (USD)	Student (USD)
Afghanistan	75.14%	$218.77	$144.19
Albania	58.49%	$365.29	$240.76
Algeria	68.72%	$275.26	$181.42
Angola	67.51%	$285.91	$188.44

Country	% Discount	Professional (USD)	Student (USD)
Antigua and Barbuda	24.89%	$660.97	$435.64
Argentina	54.59%	$399.61	$263.38
Armenia	68.08%	$280.90	$185.14
Aruba	25.01%	$659.91	$434.94
Australia	0.00%	$880.00	$580.00
Austria	8.83%	$802.30	$528.79
Azerbaijan	66.02%	$299.02	$197.08
Bahamas, The	17.21%	$728.55	$480.18
Bahrain	51.04%	$430.85	$283.97
Bangladesh	62.15%	$333.08	$219.53
Barbados	0.00%	$880.00	$580.00
Belarus	66.34%	$296.21	$195.23
Belgium	12.16%	$772.99	$509.47
Belize	36.13%	$562.06	$370.45
Benin	62.30%	$331.76	$218.66
Bermuda	0.00%	$880.00	$580.00
Bhutan	73.04%	$237.25	$156.37
Bolivia	62.18%	$332.82	$219.36
Bosnia and Herzegovina	58.94%	$361.33	$238.15
Botswana	58.26%	$367.31	$242.09
Brazil	53.17%	$412.10	$271.61
Brunei Darussalam	52.38%	$419.06	$276.20
Bulgaria	56.43%	$383.42	$252.71
Burkina Faso	62.71%	$328.15	$216.28
Burundi	70.15%	$262.68	$173.13
Cabo Verde	50.97%	$431.46	$284.37
Cambodia	66.03%	$298.94	$197.03
Cameroon	59.12%	$359.74	$237.10
Canada	0.06%	$879.47	$579.65
Central African Republic	49.88%	$441.06	$290.70
Chad	56.22%	$385.26	$253.92
Chile	43.30%	$498.96	$328.86
China	35.07%	$571.38	$376.59
Colombia	63.71%	$319.35	$210.48
Comoros	54.49%	$400.49	$263.96
Congo, Dem. Rep.	52.07%	$421.78	$277.99
Congo, Rep.	38.79%	$538.65	$355.02
Costa Rica	46.51%	$470.71	$310.24
Cote d'Ivoire	56.58%	$382.10	$251.84
Croatia	48.53%	$452.94	$298.53

Country	% Discount	Professional (USD)	Student (USD)
Curacao	22.10%	$685.52	$451.82
Cyprus	27.63%	$636.86	$419.75
Czech Republic	40.40%	$524.48	$345.68
Denmark	0.00%	$880.00	$580.00
Djibouti	43.24%	$499.49	$329.21
Dominica	36.86%	$555.63	$366.21
Dominican Republic	58.57%	$364.58	$240.29
Ecuador	49.11%	$447.83	$295.16
Egypt, Arab Rep.	70.89%	$256.17	$168.84
El Salvador	54.40%	$401.28	$264.48
Equatorial Guinea	53.32%	$410.78	$270.74
Eritrea	63.72%	$319.26	$210.42
Estonia	35.34%	$569.01	$375.03
Eswatini	57.06%	$377.87	$249.05
Ethiopia	63.69%	$319.53	$210.60
Fiji	57.83%	$371.10	$244.59
Finland	1.86%	$863.63	$569.21
France	14.21%	$754.95	$497.58
Gabon	48.60%	$452.32	$298.12
Gambia, The	65.67%	$302.10	$199.11
Georgia	70.33%	$261.10	$172.09
Germany	12.30%	$771.76	$508.66
Ghana	60.42%	$348.30	$229.56
Greece	35.21%	$570.15	$375.78
Grenada	40.48%	$523.78	$345.22
Guatemala	48.56%	$452.67	$298.35
Guinea	59.20%	$359.04	$236.64
Guinea-Bissau	60.48%	$347.78	$229.22
Guyana	61.73%	$336.78	$221.97
Haiti	41.98%	$510.58	$336.52
Hong Kong SAR, China	24.73%	$662.38	$436.57
Hungary	48.92%	$449.50	$296.26
Iceland	0.00%	$880.00	$580.00
India	68.94%	$273.33	$180.15
Indonesia	66.74%	$292.69	$192.91
Iraq	51.50%	$426.80	$281.30
Ireland	6.86%	$819.63	$540.21
Israel	0.00%	$880.00	$580.00
Italy	22.61%	$681.03	$448.86
Jamaica	54.25%	$402.60	$265.35

Country	% Discount	Professional (USD)	Student (USD)
Japan	8.51%	$805.11	$530.64
Jordan	59.77%	$354.02	$233.33
Kazakhstan	64.89%	$308.97	$203.64
Kenya	60.05%	$351.56	$231.71
Kiribati	30.26%	$613.71	$404.49
Korea, Rep.	25.92%	$651.90	$429.66
Kosovo	60.80%	$344.96	$227.36
Kuwait	47.55%	$461.56	$304.21
Kyrgyz Republic	75.86%	$212.43	$140.01
Lao PDR	70.59%	$258.81	$170.58
Latvia	40.11%	$527.03	$347.36
Lebanon	75.02%	$219.82	$144.88
Lesotho	56.51%	$382.71	$252.24
Liberia	56.65%	$381.48	$251.43
Libya	74.23%	$226.78	$149.47
Lithuania	45.08%	$483.30	$318.54
Luxembourg	0.00%	$880.00	$580.00
Macao SAR, China	38.45%	$541.64	$356.99
Madagascar	68.52%	$277.02	$182.58
Malawi	61.25%	$341.00	$224.75
Malaysia	61.61%	$337.83	$222.66
Maldives	50.67%	$434.10	$286.11
Mali	62.49%	$330.09	$217.56
Malta	30.30%	$613.36	$404.26
Marshall Islands	0.25%	$877.80	$578.55
Mauritania	69.19%	$271.13	$178.70
Mauritius	60.38%	$348.66	$229.80
Mexico	50.46%	$435.95	$287.33
Micronesia, Fed. Sts.	1.91%	$863.19	$568.92
Moldova	66.01%	$299.11	$197.14
Mongolia	64.74%	$310.29	$204.51
Morocco	57.06%	$377.87	$249.05
Mozambique	62.72%	$328.06	$216.22
Myanmar	72.68%	$240.42	$158.46
Namibia	51.77%	$424.42	$279.73
Nauru	18.87%	$713.94	$470.55
Nepal	71.30%	$252.56	$166.46
Netherlands	8.95%	$801.24	$528.09
New Zealand	0.00%	$880.00	$580.00
Nicaragua	66.98%	$290.58	$191.52

Country	% Discount	Professional (USD)	Student (USD)
Niger	54.58%	$399.70	$263.44
Nigeria	61.81%	$336.07	$221.50
North Macedonia	62.49%	$330.09	$217.56
Norway	0.00%	$880.00	$580.00
Oman	53.45%	$409.64	$269.99
Pakistan	73.83%	$230.30	$151.79
Palau	12.71%	$768.15	$506.28
Panama	54.18%	$403.22	$265.76
Papua New Guinea	34.40%	$577.28	$380.48
Paraguay	61.36%	$340.03	$224.11
Peru	51.84%	$423.81	$279.33
Philippines	61.09%	$342.41	$225.68
Poland	52.43%	$418.62	$275.91
Portugal	32.40%	$594.88	$392.08
Puerto Rico	8.46%	$805.55	$530.93
Qatar	34.48%	$576.58	$380.02
Romania	58.03%	$369.34	$243.43
Rwanda	66.57%	$294.18	$193.89
Samoa	38.65%	$539.88	$355.83
San Marino	23.60%	$672.32	$443.12
Sao Tome and Principe	44.91%	$484.79	$319.52
Saudi Arabia	52.40%	$418.88	$276.08
Senegal	57.37%	$375.14	$247.25
Serbia	57.00%	$378.40	$249.40
Seychelles	55.40%	$392.48	$258.68
Sierra Leone	71.59%	$250.01	$164.78
Singapore	37.51%	$549.91	$362.44
Sint Maarten (Dutch part)	19.42%	$709.10	$467.36
Slovak Republic	36.12%	$562.14	$370.50
Slovenia	33.06%	$589.07	$388.25
Solomon Islands	12.02%	$774.22	$510.28
Somalia	65.77%	$301.22	$198.53
South Africa	51.50%	$426.80	$281.30
South Sudan	9.32%	$797.98	$525.94
Spain	26.14%	$649.97	$428.39
Sri Lanka	73.00%	$237.60	$156.60
St. Kitts and Nevis	30.57%	$610.98	$402.69
St. Lucia	31.89%	$599.37	$395.04
St. Vincent and the Grenadines	42.97%	$501.86	$330.77
Sudan	81.88%	$159.46	$105.10

Country	% Discount	Professional (USD)	Student (USD)
Suriname	71.00%	$255.20	$168.20
Sweden	0.00%	$880.00	$580.00
Switzerland	0.00%	$880.00	$580.00
Tajikistan	79.08%	$184.10	$121.34
Tanzania	61.28%	$340.74	$224.58
Thailand	62.34%	$331.41	$218.43
Timor-Leste	67.00%	$290.40	$191.40
Togo	58.31%	$366.87	$241.80
Tonga	30.91%	$607.99	$400.72
Trinidad and Tobago	43.27%	$499.22	$329.03
Tunisia	66.15%	$297.88	$196.33
Turkey	68.54%	$276.85	$182.47
Turkmenistan	53.00%	$413.60	$272.60
Turks and Caicos Islands	0.00%	$880.00	$580.00
Tuvalu	0.00%	$880.00	$580.00
Uganda	64.21%	$314.95	$207.58
Ukraine	65.99%	$299.29	$197.26
United Arab Emirates	45.65%	$478.28	$315.23
United Kingdom	4.71%	$838.55	$552.68
United States	0.00%	$880.00	$580.00
Uruguay	30.88%	$608.26	$400.90
Uzbekistan	76.66%	$205.39	$135.37
Vanuatu	0.00%	$880.00	$580.00
Vietnam	68.03%	$281.34	$185.43
West Bank and Gaza	40.90%	$520.08	$342.78
Yemen, Rep.	56.43%	$383.42	$252.71
Zambia	69.08%	$272.10	$179.34
Zimbabwe	28.93%	$625.42	$412.21